DEPARTMENT OF THE ARMY
ARMY CONCEPT TEAM IN VIETNAM
APO San Francisco 96384

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29 September 1967

SUBJECT: Letter Report of Evaluation - Battery Powered Fluorescent Lamps (ACL-7/671)

TO: Commanding General
United States Army, Vietnam
ATTN: -AVHGC-DST
APO 96375

1. REFERENCES

a. AMCRE-CPC report dated 19 August 1966, subject: Southeast Asia (SEA) Weekly Report.

b. DA message 789134, dated 3 November 1966.

c. USARV message AVHGC-GH 37248, dated 24 November 1966, subject: New Equipment for Vietnam Evaluation.

d. DA message 792506, dated 2 December 1966, subject: New Equipment for Vietnam Evaluation.

e. AMC message 9708, dated 13 December 1966, subject: New Equipment for Vietnam Evaluation.

f. Natick Labs message 2293, dated 13 December 1966, subject: Battery Operated Fluorescent Lanterns.

2. PURPOSE

Determine the acceptability, suitability, durability, utilization, reliability, and maintainability of battery powered fluorescent lamps in a tropical combat environment.

3. BACKGROUND

a. During late August 1966 two Burgess battery powered fluorescent lamps, commercially known as the Safari Lite were brought to USARV Headquarters

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by a Natick Laboratories representative for inspection and demonstration purposes.

b. Natick Laboratories procured 50 lamps which were modified at the laboratory, and 300 batteries for evaluation in Vietnam. The modifications consisted of painting the lamp with flat OD paint and inclusion of a green nylon reflector cover.

4. OBJECTIVES

a. Objective 1 - Suitability

(1) Determine if the battery powered fluorescent lamp provides adequate lighting.

(2) Determine if the dimensions, design, materials, and construction are suitable.

b. Objective 2 - Durability

(1) Predict the lifetime (service life) of the battery powered fluorescent lamp and determine the average life expectancy of the batteries.

(2) Determine effect of the tropical environment on the battery powered fluorescent lamp.

c. Objective 3 - Acceptability

Determine troop acceptance of the battery powered fluorescent lamp.

d. Objective 4 - Utilization

(1) Determine the ways in which the battery powered fluorescent lamp is utilized.

(2) Determine the ways that battery powered fluorescent lamps can best be utilized to satisfy lighting requirements in the Vietnam environment (within the scope of the evaluation).

e. Objective 5 - Reliability and Maintainability

Determine the reliability and maintainability of the battery powered fluorescent lamps.

5. DISCUSSION

a. ACTIV received 50 battery powered fluorescent lamps fc evaluation on 24 December 1966. During the month of January 1967 distribution of these lamps was made to the 1st Cavalry Division, 1st Infantry Division, 173rd Airborne Brigade, 9th Infantry Division, 5th Special Forces Group, 14th Transportation Battalion. 101st Airborne Division, Headquarters Area Command Engineers, and other individuals and units. A letter requesting user evaluation and user debriefing questionnaires were distributed with the lamps.

b. The lamp has a 12-inch miniature fluorescent tube powered by two 69-volt batteries or by 117-volt ac line power. The lamp is designed to be hand carried, suspended from two eyelets on the back of the lamp, or placed on a flat surface. Rubber feet on the lamp base provide protection when the lamp is placed on flat surfaces. An on-off switch and a hi-start/low intensity level (Power Miser) switch located adjacent to the carrying handle provide operating controls for the lamp. A battery-ac switch and a connection for ac power are located on the opposite side. Also included with each lamp are a green nylon reflector cover with Velcro fasteners, three sets of batteries, and operating instructions. The batteries are non-rechargeable carbon-zinc type commercially designated by Burgess as type 2 L6. A 6-foot power cord is provided to connect the lamp to a 117-volt ac power source.

c. ACTIV requested lamp users to complete a questionnaire after utilizing the lamps for a 60-day period, or when a battery replacement was required. ACTIV received 30 completed questionnaires from units and individuals in the field evaluating the lamps. Replies indicated that the lamp was used at all levels of command from platoon through division level in the field, and in administrative offices.

d. In the opinion of users, 93 percent indicated that the fluorescent lamp was a good replacement for other sources of illumination, such as the Coleman gas lantern or other battery powered lights. Lack of noise, absence of heat and fumes, and the option of ac or batteries as a power source were distinct advantages over the Coleman lantern. Several comments indicated concern over the capability of the logistical system to provide adequate replacement batteries.

e. Respondents stated that the lamp was used as a primary source of illumination (84 percent), as a supplementary source of illumination (85 percent), and as an emergency source of illumination by all respondents. Prior to using the battery operated fluorescent light, respondents stated that sources of illumination were Coleman lanterns, electric lights (both

incandescent and fluorescent), flashlights, alcohol lamps, and kerosene lamps. Electric lights were the most common source of illumination. The lamp was hand carried (18 percent), suspended overhead (27 percent), and placed on a desk or table (53 percent) by users during this evaluation. In one instance the lamp was placed on the ground about 30 feet from a helicopter to illuminate loading and unloading operations.

f. No unsafe features of the battery operated fluorescent lamp were identified during the evaluation. The lamp provided sufficient intensity of light for all evaluation applications.

g. Weight of the lamp was considered satisfactory for field use and no construction or design defects were discovered.

h. The ACTIV project officer conducted two tests on the lamp to determine approximately the hours of operation that could be expected from the batteries. Instructions furnished with the lamp stated that over 100 hours of battery life could be expected when using the lamp in the low-intensity mode. Starting with new batteries and operating the lamp until failure for 1 to 8-hour periods, with the Hi/Start - Lo switch in the low intensity position, a total of 82 hours of operation was accumulated before battery failure. A second similar test was conducted but with hi-intensity illumination and provided a total of approximately 50 hours operation. Users reported battery life ranging from approximately 25 hours to over 100 hours. However, due to absence of information as to intensities used, it appeared that users obtained a battery life expectancy similar to results obtained by the project officer.

i. Sixty-three percent stated they utilized the "Power Miser" switch in the Lo position to extend battery life. An equivalent percentage of users stated that ac power was available for powering the lamp, but only 12 respondents stated that ac power was used when available to conserve batteries. One respondent reported interference with communications equipment when the lamp was used. In this instance ac power was used.

j. Seventy percent stated a preference for rechargeable batteries. However, the advisability of using rechargeable batteries was questioned, primarily because of cost and weight and design requirements.

k. Users reported that humidity, temperature, condensation and environmental factors had no detrimental effect on the lamp. The clear plastic lens cover proved durable in providing protection to the fluorescent tube and reflector. Two-thirds of the users desired the green nylon reflector cover issued with the lamp. No failures of the fluorescent tube were reported during the evaluation.

l. Prior to distribution of the lamps to units, an in-house examination was conducted by ACTIV. Potential shortcomings included the lack of environmental protection of the electrical components located directly above the battery compartment. In addition, the ac receptacle appeared fragile and the suspension eyelets too small for convenient field use.

m. All users considered the lamp sufficiently durable for field conditions during the period of evaluation.

n. Results of evaluation indicated the battery powered fluorescent lamp was an acceptable and highly desirable item for issue to troop units in the Republic of Vietnam.

6. FINDINGS:
It was found that:

a. The battery operated fluorescent lamp provides adequate lighting.

b. Construction and design of the lamp is suitable for use in the Republic of Vietnam environment.

c. The lifetime of the batteries depends on the intensity mode in which the lamp is operated. Life expectancy of the battery varies from 25 to over 100 hours.

d. The tropical environment did not affect the battery powered fluorescent lamp.

e. The battery powered lamp was used at all levels of command from platoon through division, and in administrative offices.

f. The battery powered fluorescent lamp was used for illuminating tactical operations centers, CP tents, medical clearing stations, supply tents, fire direction centers and dispensaries.

g. The lamp proved reliable and no problems in maintenance were encountered.

h. The battery powered fluorescent lamp requires the following improvements prior to procurement and issue to field troops.

(1) Addition of a grenade-type ring to the suspension eyelets.

(2) Moisture-proffing of the electrical compartment.

7. CONCLUSIONS

It was concluded that:

a. The battery operated fluorescent lamp is a suitable, acceptable, and desirable item for issue to US troops operating in the Republic of Vietnam.

b. The battery operated fluorescent lamp has adequate durability to justify issue in Vietnam.

c. The battery operated fluorescent lamp provided adequate lighting for the purposes for which it was utilized in this evaluation.

d. The battery operated fluorescent lamp is reliable. Battery life limits the number of hours of operation, but operation on external ac power will conserve batteries.

e. The length of evaluation did not permit meaningful prediction of service life of the battery operated fluorescent lamp.

f. The improvements listed in paragraph 6h above would improve the utilization of the battery operated fluorescent lamp and add to its durability in damp areas.

8. RECOMMENDATIONS

It is recommended that:

a. The improvements listed in paragraph 6h be incorporated into the lamp.

b. The battery operated fluorescent lamp be procured for issue to combat, combat support, and combat service support units and troops operating in the Republic of Vietnam.

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Colonel, Infantry
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13. ABSTRACT

After 60 days of field evaluation it was concluded that the Battery Powered Fluorescent Lamp is a suitable, acceptable and desireable item of issue to US troops operating in RVN.

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